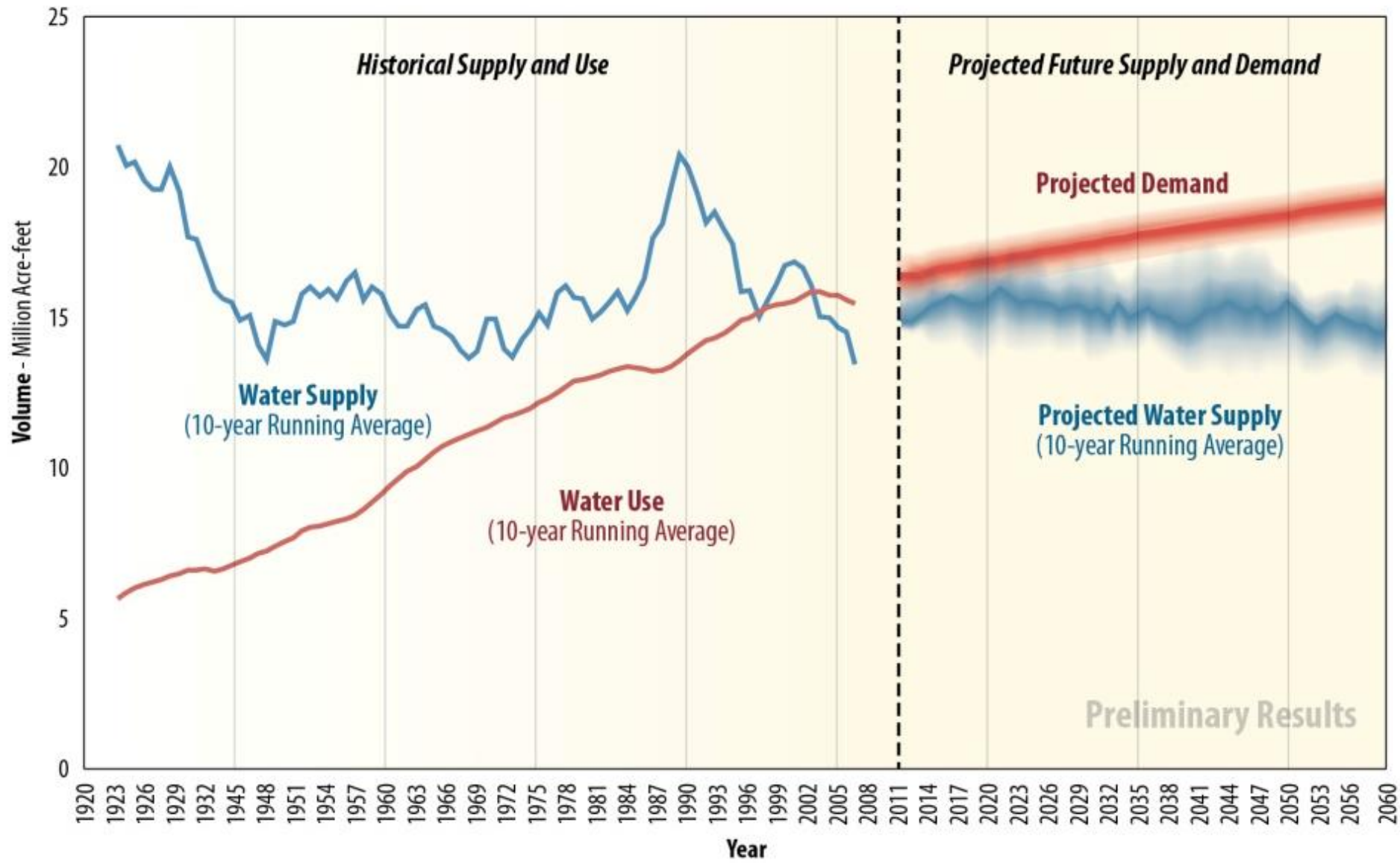


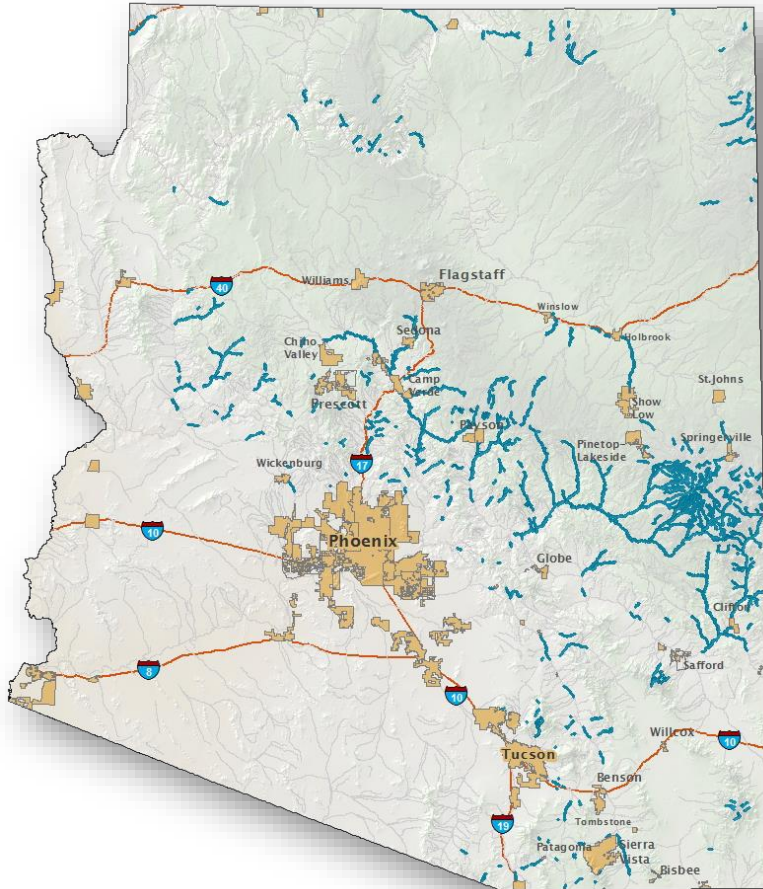
The Nature Conservancy in Arizona



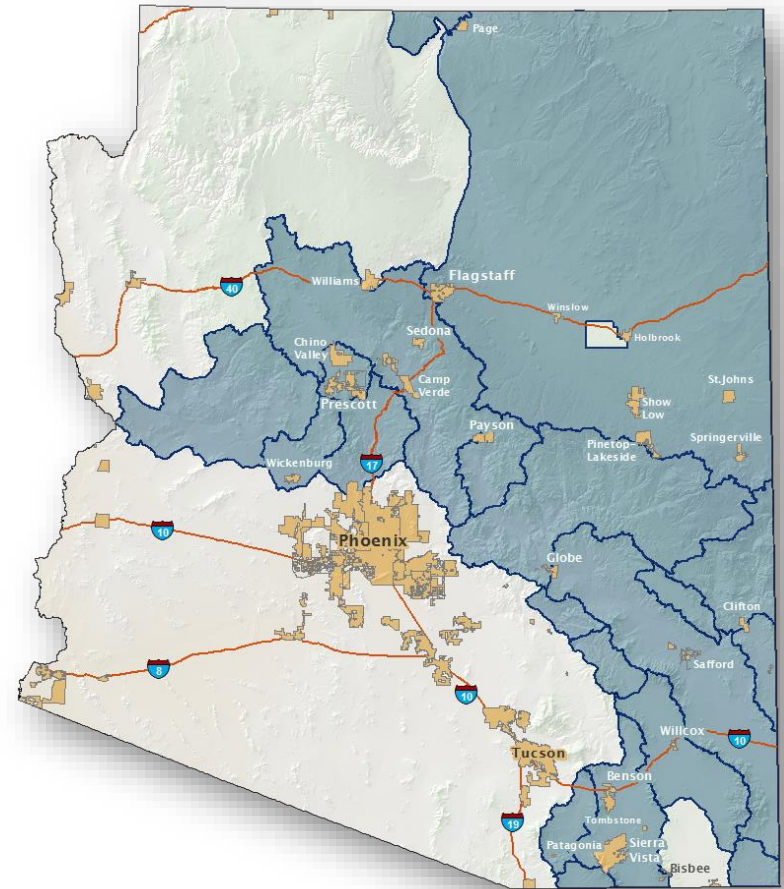
Historic and Future Colorado River Water Supply



Is Arizona's water future secure?



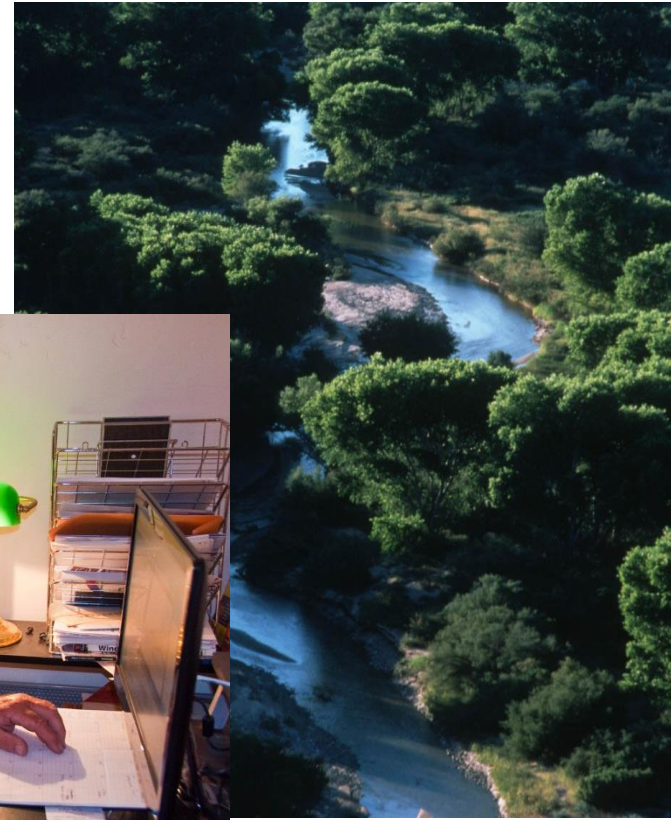
3,000 + miles of perennial rivers



At-risk basins in 2035

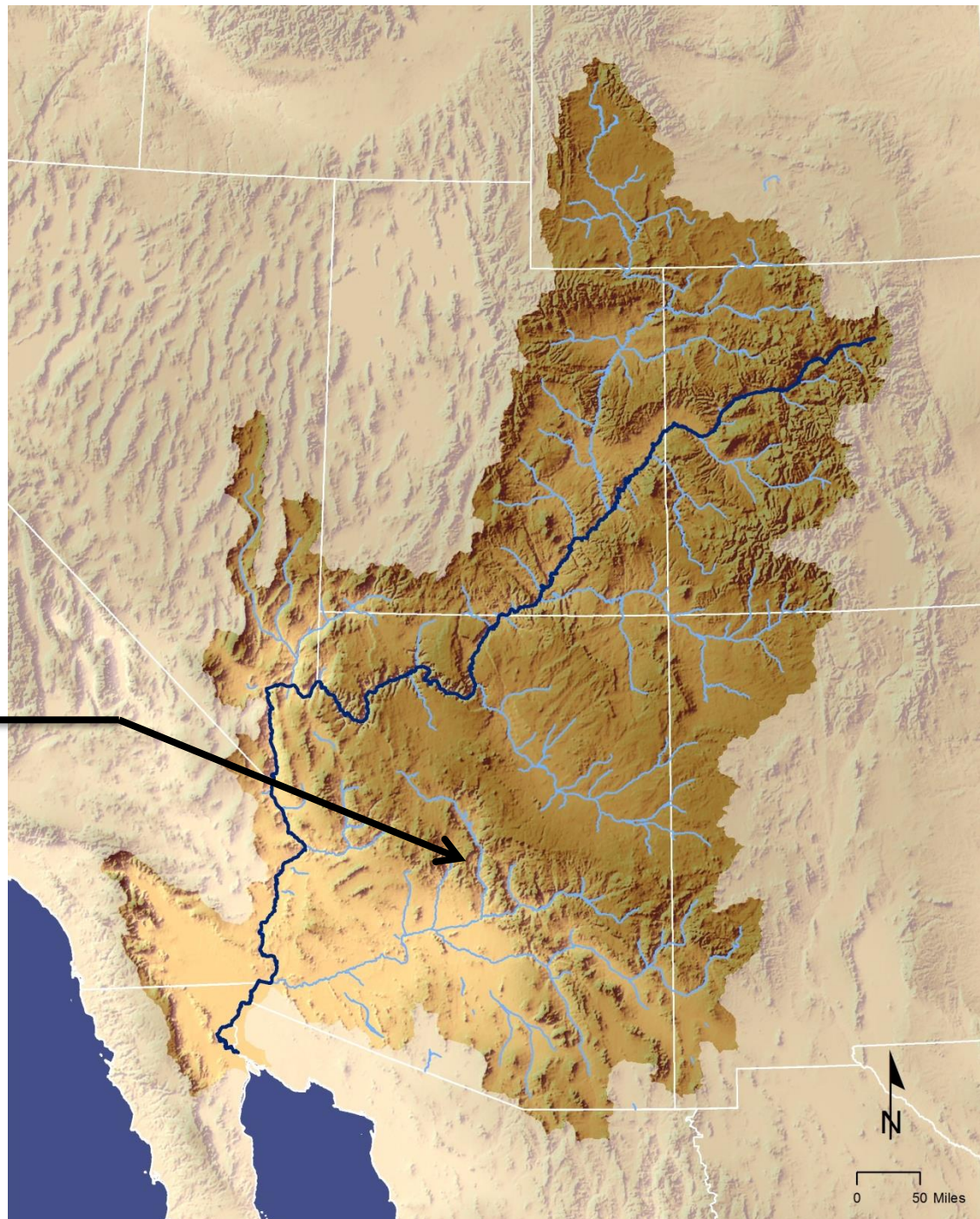
Results from Arizona's Water Resources Development Commission, 2011

Flexibility and Innovation for Water Management Solutions



Colorado River Basin

Verde





Conservation of Ag Water: Environmental Water Transactions

1. Fallowing Agreements
2. Crop conversion agreements
3. Irrigation infrastructure
4. Forbearance agreements



Fallow Agreements

WORKING WITH THE LAWS WE HAVE

1. Full season fallowing

- takes land out of production for full year

2. Summer fallowing

- Water in the river in summer when most needed
- Land in production a portion of year (pasture or crop)



Crop Conversion Agreements

ECONOMICS TO DRIVE RIVER CONSERVATION

1. Subsidize conversion

- low water use, low water crops

2. Develop market interventions

- Malt house
- Partnerships with growers from other regions



Irrigation Infrastructure

THE RIGHT EQUIPMENT TO DO THE JOB

1. Conveyance Infrastructure
 - piping, lining, controls, monitoring, check structures

2. On Farm Efficiency
 - Allows crop conversions
 - Decreases water demand



Forbearance Agreements

PAY FOR PERFORMANCE

1. Ditch flow targets
 - Encourages sharing of shortages within users
 - Buffers from climate variability
2. River Flow Targets
 - Increased risk for ditch
 - Encourages sharing of shortages



Colorado River Basin

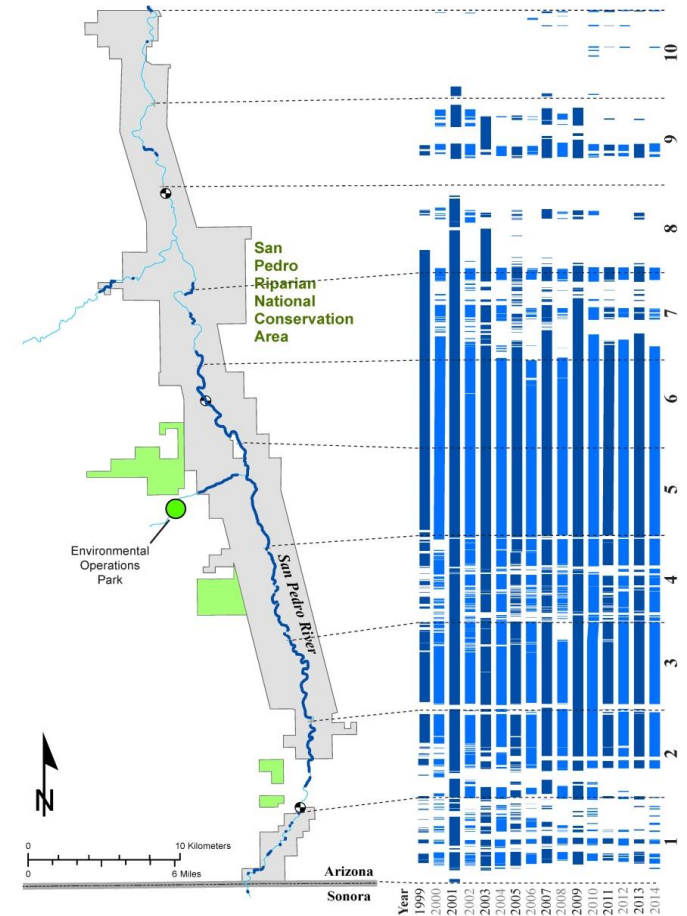
San Pedro



Groundwater Recharge

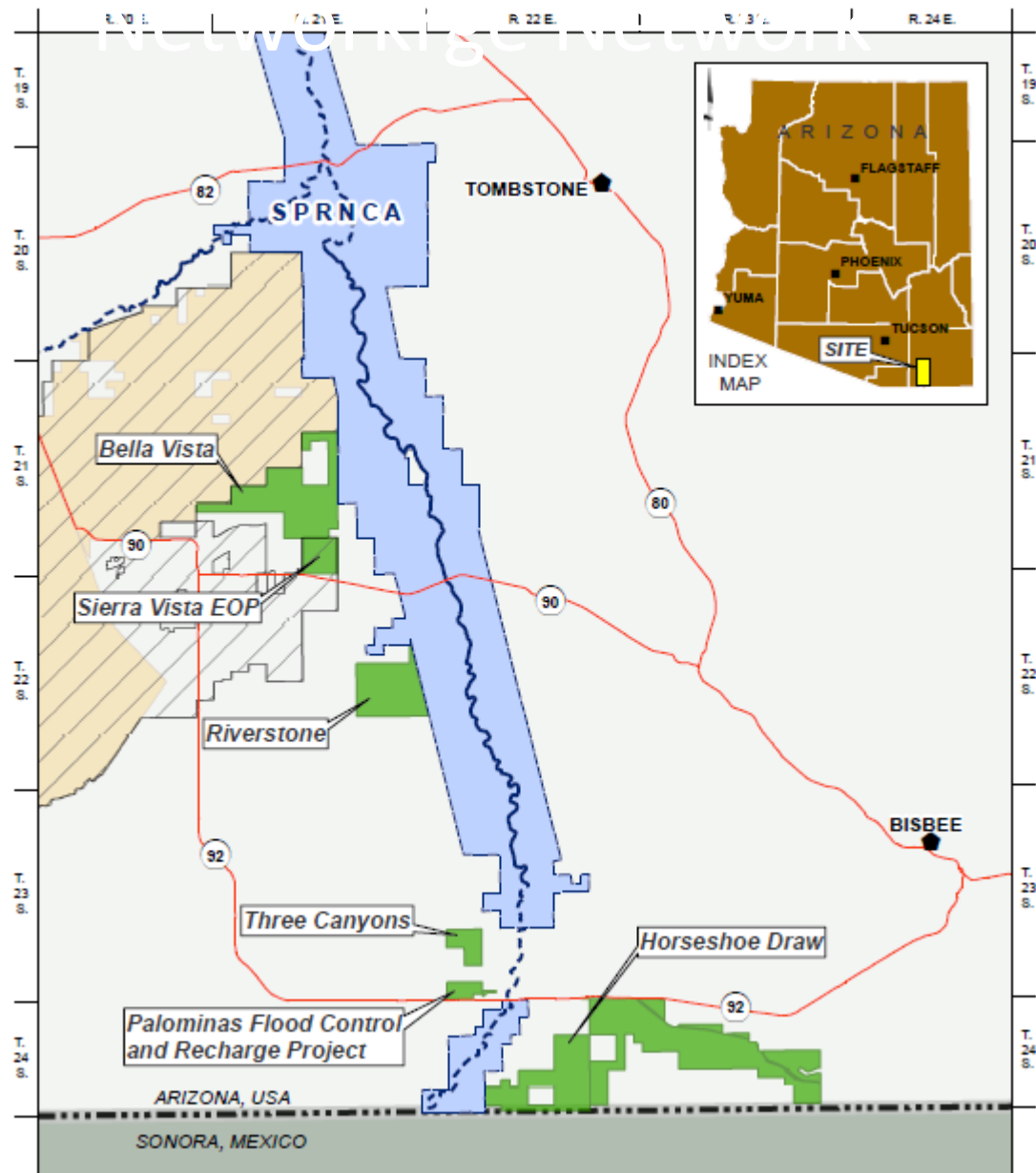
THE COCHISE CONSERVATION AND RECHARGE NETWORK

- Wet-dry mapping informs where placement of aquifer recharge facilities could help the river the most
- The six recharge projects are shown relative to where flows have fragmented, based on the past 18 years

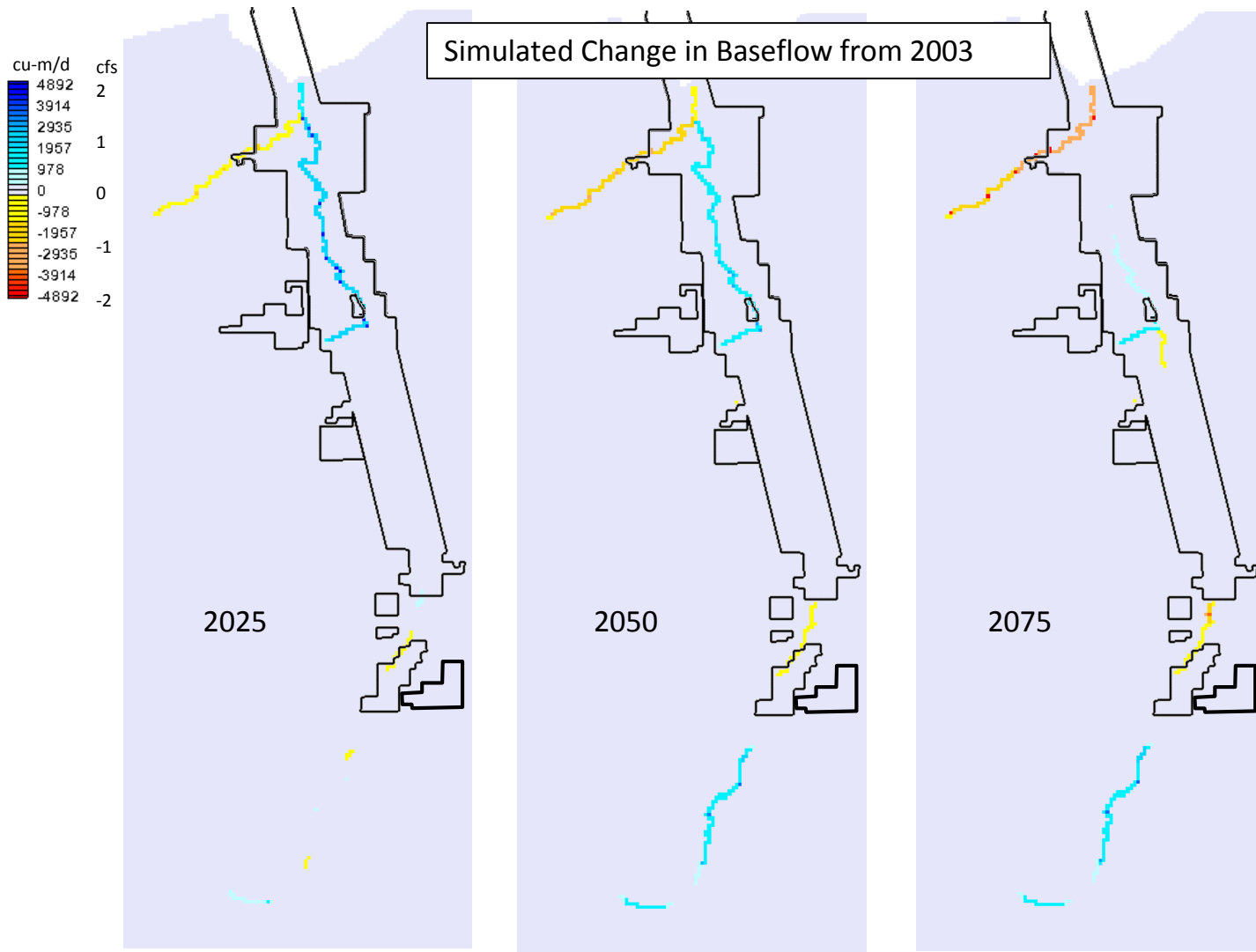


Wet/dry results from the San Pedro Riparian National Conservation Area. The heavy river line shows reaches which were wet in June 2014. Bars on right side represent wet reaches for each year, 1999-2014. Labels on the far right identify the 10 analysis segments, each covering 5 miles (8.1 km). The four properties shown in green on map were recently acquired for groundwater protection or recharge projects.

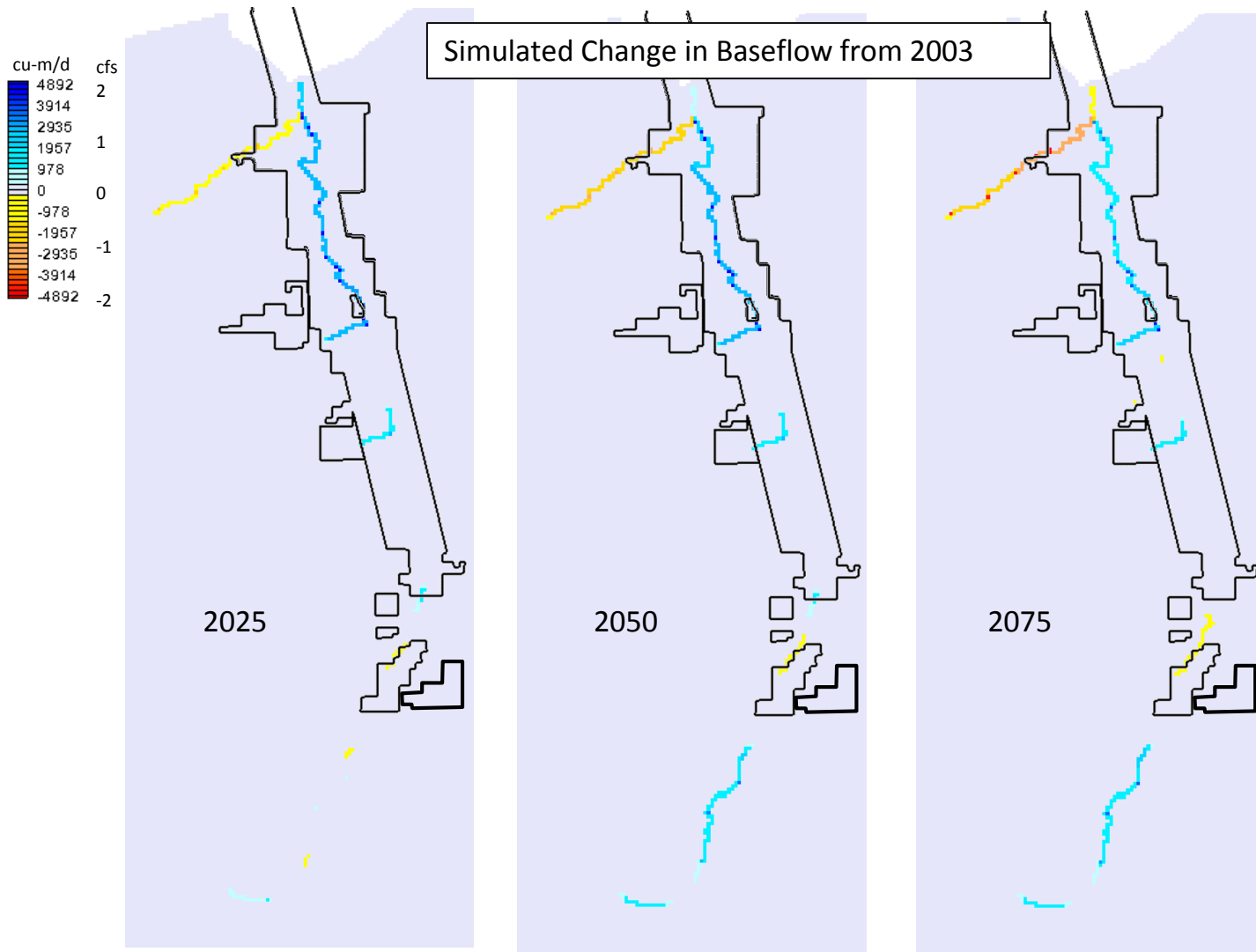
The Cochise Conservation and Recharge Network



*** PRELIMINARY RESULTS-MODEL UPDATES NOT INCLUDED***



*** PRELIMINARY RESULTS-MODEL UPDATES NOT INCLUDED***

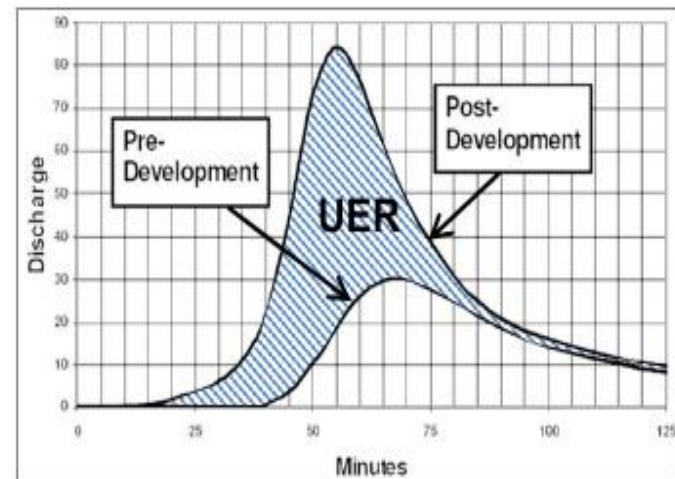


WITH RECHARGE PROJECTS

The Cochise Conservation and Recharge Network

GROUNDWATER RECHARGE: URBAN ENHANCED RUNOFF

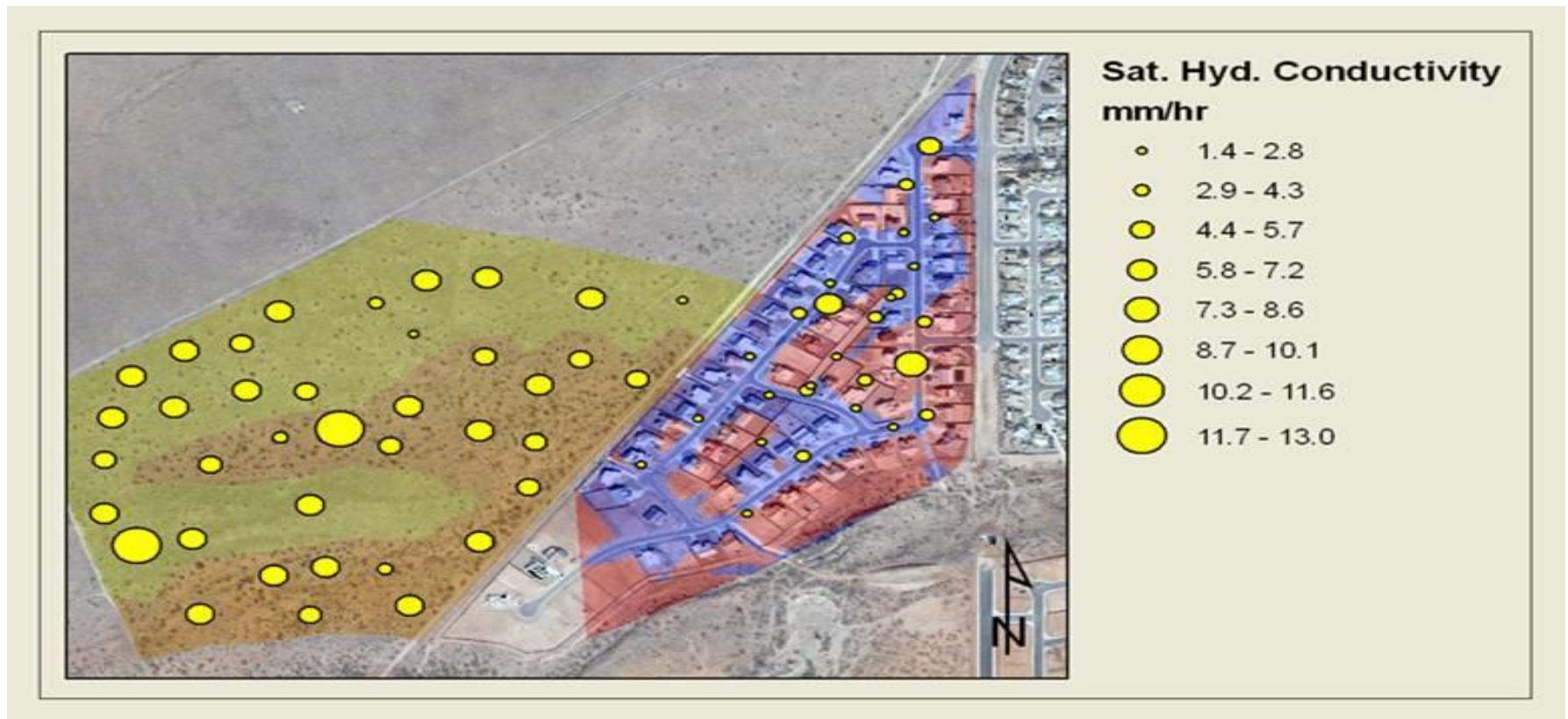
- Urbanization (and impervious surfaces) prevents the infiltration of rainfall into the ground
- Water is largely lost to evaporation and/or increases flood peaks
- Can be a useful source of water for recharge



Example of runoff hydrograph under pre-and post-development conditions in Bangalore, India (Adapted from Fig. 12-2 in Ramachandra and Mujumdar, 2009)

The Cochise Conservation and Recharge Network

RUNOFF INCREASED FROM 2% OF TOTAL
RAINFALL TO 37% OF RAINFALL WITH
URBANIZATION AT THIS SIERRA VISTA
SUBDIVISION



The Cochise Conservation and Recharge Network

GROUNDWATER RECHARGE: SHEET FLOW

- Sheet flooding can be hazardous in some areas, usually as a result of soils
- Constructed channels can capture sheetflow and recharge it into aquifers



Palominas Flood Control and Recharge Project

The Cochise Conservation and Recharge Network

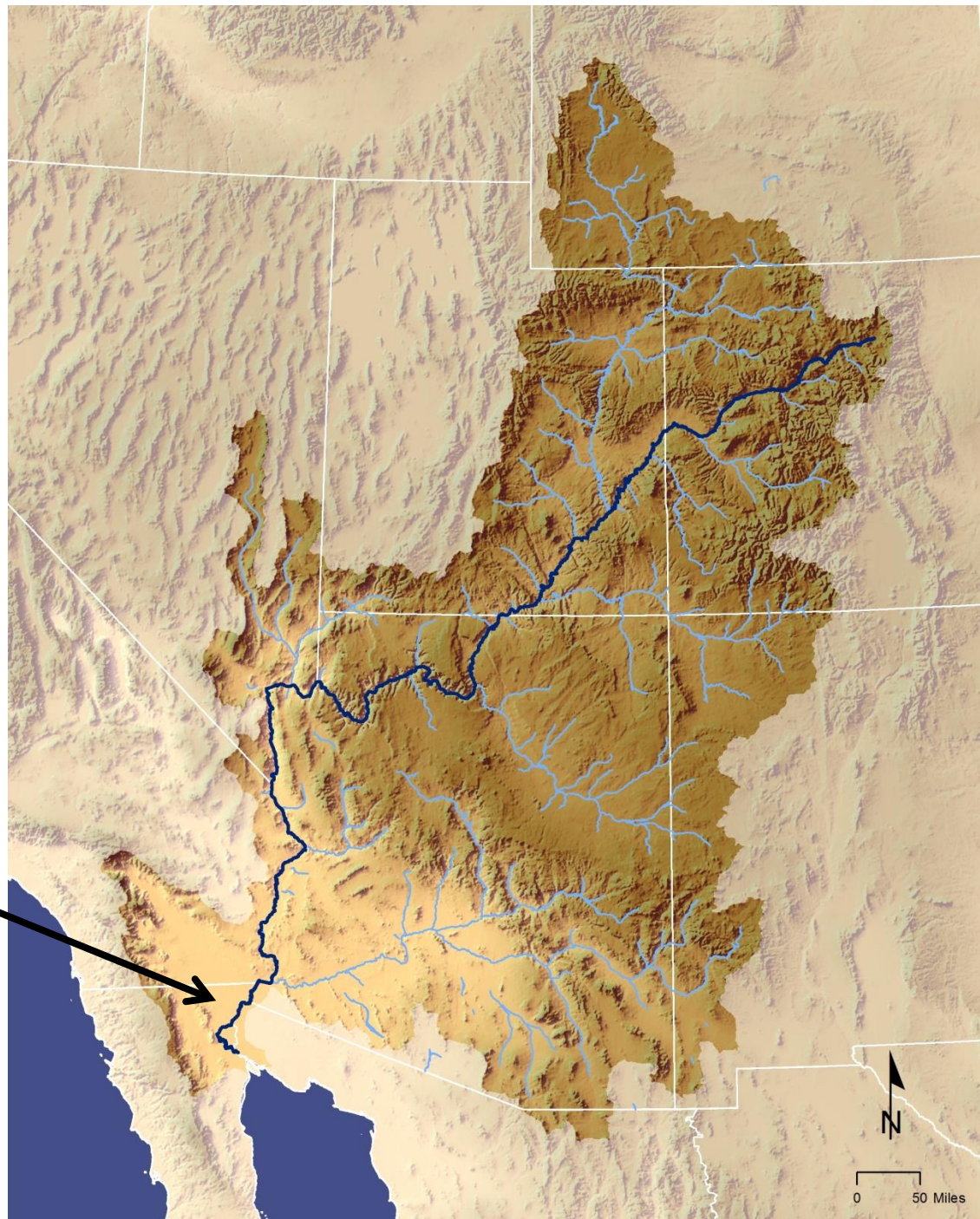
GROUNDWATER RECHARGE: TREATED EFFLUENT

- 50 acres of treatment wetlands
- 30 acres of recharge basins
- Capacity to treat 4 million gallons per day
- Recharges over 2,700 acre-feet per year
- -Less variability than stormwater for recharge



Colorado River Basin

Delta





Las Arenitas Wastewater Treatment Plant



Google earth

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3000 ft



Thank you

Questions?

